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ABSTRACT

This paper examines the evolution of computer software programs designed to support the qualitative research process; the differences between existing qualitative software and Metamorph(TM); and the use of Metamorph(TM) for qualitative research. The paper begins by presenting an overview of computer use in qualitative research, which includes a list of major analysis tasks employed by qualitative researchers and information on artificial intelligence and hypertext programs; issues of concern to qualitative researchers; the impact of microcomputers on social science research; and the adaptation and design of qualitative research tools. The section on Metamorph(TM) describes the program; its utilization in the research process; and studies using the program, including the Cooperative Alliance for Gifted Education (CAGE), a partnership grant currently in progress at Kent State University (Ohio). The names and addresses of four computer discussion groups are included. (Contains 14 references.) (ALF)

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Metamorph™: Computer Support for Qualitative Research

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Qualitative research often requires the analysis of large quanities of unstructured data. Research questions are addressed using data in the form of interviews, observations, field notes, journals, video and audio tapes. In order to deal with this type of information qualitative researchers have had to rely on paper, index cards, markers, hole punches, scissors, and tape. Computers are beginning to aid in the process. The most common software tool supporting qualitative research is the word processor. There is evidence in the literature to suggest that computer software programs are being designed to specifically support qualitative research data analysis.

The nature of computer software programs, however, tends to be highly structured. This may pose a problem to the qualitative researcher trying to fit unstructured data into a highly structured computer environment. A solution to this problem may exist in the form of a uniquely designed text analysis program, Metamorph™. This program is able to manipulate raw (ASCII) data without imposing the classical, computerized logic.

The purpose of this paper is to examine the evolution of computer software programs designed to support the qualitative research process. The differences between existing qualitative software and Metamorph™ will then be explored. Finally, examples of the use of Metamorph™ for qualitative research will be presented.

Overview of Computer Use in Qualitative Research

Introduction

Reflecting on a 1984 special issue of the journal Qualitative Sociology, Tesch (1989) comments on the vision and expectations posited in comparison to events which

have transpired over the past several years.

> We don't seem to have advanced much in the direction [Conrad and Reinharz, (1984)] expected. No revolutionary software for interpretive text analysis has been introduced. . . . The dissemination of existing analysis software has been relatively slow, and the literature about computer-assisted qualitative analysis is still sparse (p. 142).

A dissemination path of computer and software use is illustrated through these early articles. Illuminated are the expectations held and, in hindsight, unconfirmed expectations are revealed. An example of a global expectation was that revolutionary ideas (i.e., computers would "listen" and enter the text of audio taped interviews, or intelligent computers would perform sophisticated analysis) would be developed and diffused more rapidly.

The following is a list of some of the major analysis tasks employed by qualitative researchers (Tesch, 1991, pp. 26-28):

1. Locating individual words and phrases
2. Creating alphabetic word lists, counting the frequency of the occurrence of words
3. Creating indices (attaching source information to each occurrence) and 'key word in context' concordances
4. Attaching key words to segments of text
5. Attaching codes (categorization symbols to segments of text [and]

6. Connecting codes (categories)

Text handling software

For those faced with recording, organizing, and interconnecting mounds of data, the use of word processing and data base software affords a way to tame this part of the analysis process. Adding codes, copying passages, assembling items of like classification, attaching analysis notes to files are easily accomplished with word processing software. (Easy relative to actually producing multiple copies of data sources, physically cutting and pasting, coding, sorting, and filing the data for latter analysis strategies.) Some researchers have ventured into electronically arranging their data into fields based on coding strategies for importation into or creation in data base programs. This provided a means to search for possible patterns and/or connections between and among categories (fields). A task not easily accomplished in word processing. These text handling packages have greatly eased the preparation steps which precede deeper analysis strategies.

Of interest, but not widely used in qualitative research, are hypertext programs and Artificial Intelligence (AI). The advent of hypertext programs provides a way to link concepts in a nonlinear fashion to facilitate browsing. "Hypertext is . . . a means of navigating from one node of information to another node of information in an associative manner" (Gluck, 1991, QUALRS-L discussion group). Thoughts of utilizing AI has raised hopes for the creation of AI programs which would perform sophisticated analysis strategies like those employed by human beings. Currently, AI is not

synonymous with the cognitive functions of a human brain. Development and research into AI embodies a variety of approaches. Some AI development strategies are built on (a) rule based systems, (b) precedent based systems, or (c) natural language based systems (Schrodt, 1989). Brent (1989) suggests that two AI subareas, expert systems and natural language understanding, hold promise for qualitative research. Certainly, developments in AI are of great interest for researchers in both qualitative and quantitative paradigms.

Concerns

Qualitative researchers have been advised to consider the computer a tool and to minimize computer and software promises and hype (Pfaffenberger, 1988; Tesch, 1989). Pfaffenberger (1988) maintains that "microcomputer hardware and software can play a useful role in qualitative studies, but only if the limitations of the technology -- and especially, its potentially negative or constraining impact -- is kept in mind throughout" (p. 9). Beyond financial constraints, issues which are potentially negative or constraining are:

(1) concern centered on "letting the technological abilities of computer software define our research problems" (Conrad & Reinharz, 1984, p. 10).

(2) concern that the use of computers will put researchers at a distance from their data (Lyman, 1984; Seidel, 1991).

(3) concern over the accumulation of volumes of data. "I believe that the volume of data will drive the analysis and that the researcher will end up

missing interesting and important things in the data" (Seidel, 1991, p. 109).

(4) concern that computer use will lead to a "Reification of the relationship between the researcher and the data" (Seidel, 1991, p. 112).

(5) concern that researchers may prematurely terminate the data analysis process (Freidheim, 1984).

A Study of Computer Use in Research

Danziger (1989), using a series of empirical studies, over a four year period, examined "the effect of microcomputers on academic social scientists" (p. 60). Although he cautions that his findings are based on one group of social scientists in a single academic setting, two of his findings illustrate the impact of microcomputers on the work of this group.

1. Word processing accounted for the primary utilization of microcomputers. "More than four-fifths of utilization is for word-processing activities and three-fourths of total use is directed to the work domain of research" (p. 74).
2. This group of social scientists attributed the improvement in the quality of their research to their utilization of the microcomputer.

To sum up, Danziger states:

> The social scientists studied here believe that the use of microcomputers in their work has not altered the information-processing tasks in which they engage but that they now have far greater personal control over those tasks and that they are doing them much more effectively (p. 76).

Developments

Adaptation of existing computer software (i.e., word processing and data base) has provided some assistance to qualitative researchers. As the limits of adaptation are reached, the need increases to combine the best of existing software and accommodate and incorporate researchers' analysis techniques and strategies. This need led some qualitative researchers to design their own tools. Examples of these are Ethnograph™, Ethno™, HyperQual™, HyperResearch™, Hypersoft™, MECA™, Nudist™, Qualog™, Qualpro™, TAP™, and Textbase Alpha™ (Fielding & Lee, 1991).

A reflection of the interest in computer use for data analysis can be found in the initial dialogue flooding the QUALRS-L* (Qualitative Research for the Human Sciences) discussion group via BITNET. This discussion group, begun September 6, 1991, currently has 366 members. Discussions of the use of computers in qualitative research dominated this list for the first month and a half. These early discussions focused on (a) types and uses of computer programs known (i.e., Ethnograph™) and not as well known (i.e, Kwalitan™ **), (b) experimental software (i.e, ATLAS/ti***, ART****) and its availability to beta-tester, (c) strengths of IBM and MAC, and (d) the use of and explanation of hypertext.

Summary

Interest in computers as a tool in qualitative research has had strong appeal within the research community. Researchers have found a way to use existing software as designed and to utilize creative adaptations of software programs to further their

analysis processes. Frustration with creative adaptation has led some to develop a software tool to meet their data analysis approach. One thing is certain, as additional software tools and modifications to existing programs become available, there will be users ready, willing, and able to apply them in qualitative research. For some researchers, computer use is a necessity in data analysis. As expressed recently via the QUALRS-L discussion group:

> i think part of the fascination of social scientists with computer programs such as ethnograph and hypertext arise out of a subjective frustration that occurs when one is too close to one's data -- and needs to find a relatively unbiased way to approach the text. the rapid manipulation of text, and the oftentimes accidental juxtaposition of images, can allow experimentation with data that could take, literally, forever, without the new media technologies. statisticians aren't the only ones, now, who have convenient 'tools' to explore recurring patterns in their data ... (Wilson, 1991, QUALRS-L discussion group).

Metamorph™: A Discovery

Qualitative data analysis requires the researcher to sift through large quantities of text to develop taxonomies, explicate themes, formulate hypotheses and/or generate support for triangulation. Computer programs are slowly evolving and beginning to meet the needs of the qualitative researcher. Unfortunately, most software programs do not provide the liberty to freely search multitudes of unorganized textual data.

A sophisticated computer software program was accidentally discovered that may

have the potential to assist many qualitative researchers in data analysis. A professor at Kent State University, Dr. William Patton, had been reading through some business articles that were reviewing computer software. He came across a description of Metamorph™, a free-form text analysis tool used primarily by business and government agencies. Dr. Patton believed the nature of Metamorph™ could lend itself to qualitative research. Several of Dr. Patton's colleagues believed the software was worth exploring the potential of this program and contacted the developers.

It was to Kent State University's advantage that Metamorph™ was written and distributed by a Cleveland business firm, Expansion Programs International, Inc. Several KSU researchers brought the author of Metamorph™, Bart Richards, to campus to explore the possibilities of using his program for qualitative research. The program was purchased and the exploration began. Kent State University has been working with Richards for nearly two years in determining ways to adapt the essence of Metamorph™ to the needs of the qualitative research community.

Metamorph™: A Description

Metamorph™ is a computer software program designed to work with large quantities of unstructured text. It is currently being used in many fields and areas of inquiry such as (a) medicine (e.g., cancer and AIDS databases), (b) air mishap analysis, (c) law, (d) Bible study, and (e) government contract and procurement tracking.

Typically, Metamorph™ is used to quickly scan documents, manuals, and unstructured records to find information. As an example, Metamorph™ is used by

attorneys as they look for documented support in legal cases. By historically retracing the information searching process we can see the benefits of the Metamorph™ technology.

Looking back only a decade ago the attorney would go to the library and begin his/her "case support" search by looking through a table of contents or index. Once a referent and page was found, the reference was read and the lawyer would determine whether the information was applicable. At this point the information was duplicated for future use. The procedure was slow and tedious.

In the last eight years on-line databases have aided in the search process. Databases are highly structured information sources. Raw or unstructured information, (i.e. reference manuals, transcriptions, etc.) is then manipulated into broad categories called records, then subdivided into more discreet categories called fields. Information is retrieved by using key words that have been predetermined by the database program. The person who does the information search is dependent upon the design of the database. Free and random searching is typically not possible. Structured, on-line databases are currently helping attorneys in their information search.

Metamorph™ has the potential to revolutionize information searching. This program is useful for both on-line databases (e.g. LEXIS) and ASCII transcriptions of actual court hearings. The program user is able to freely search information by entering a word, a concept, a proper name, or a combination of words. Metamorph™ is able to rapidly scan vast amounts of information finding "hits". The Metamorph™ "hit" is the

actual word(s) or a thesaurus form of the word(s). This information is presented on the computer monitor in its original context with the "hits" highlighted.

Once the information is presented on-screen, the person using Metamorph™ is able to mark any information he/she wants to retain and save this information to an appendable file. This process allows rapid, unstructured information searching, in-context judgement of information relevance, and "clipping" of selected information which can be saved in ASCII format.

What does Metamorph™ mean for Qualitative Research?

Unlike other computer data analysis software, Metamorph™ is a tool which can be utilized throughout the research process. It provides a way for researchers to handle large quantities of data that might otherwise appear daunting. There is often a concern that significant literature may be overlooked when searching through vast amounts of information. Because of Metamorph's™ efficient and thorough search "engine" it is possible to 1) search through all the available article abstracts found on CD-ROM and, 2) review the selected articles (converted to ASCII text files) using Metamorph™.

After the initial review of literature, Metamorph™ can continue to be used at various stages of data analysis. Qualitative data are entered into the computer as ASCII text files. These data can take the form of field notes, text transcriptions of audio tapes, subjects' and researcher's journals, etc. Initial data analysis can begin once these files are available to the Metamorph™ computer program.

Data query can be done in a natural language format or through word concept

structure. Metamorph™ is built on semantic relationships allowing the researcher to query the data from multiple perspectives. To understand how Metamorph™ accomplished this task think about matching all query word items against all possible thesaurus entries. After making list sets of all combinations of thesaurus combinations, Metamorph™ rapidly scans the text files for corresponding matches. When a "hit" is found it is highlighted and the computer displays the information in context on the monitor for the researcher to review.

Preliminary broad groupings can be saved into separate text files. These files can be further analyzed to facilitate the refinement of data groups into thematic relationships, domain categories or matrices building. In multiple case study research, within-site files can be queried to develop insights into cross-sites' similarities and differences.

The act of querying, by posing questions (Ask mode) or searching for related concepts (Search mode), creates an interactive environment during data analysis. Responses to a query (Hits) are displayed on the monitor. This provides immediate information to the researcher on how successful the query was and leads the researcher to utilize higher level thinking strategies to uncover subsequent findings or in guiding the rephrasing of the query. In essence, Metamorph™ allows the researcher to have a conversation with his/her data.

Qualitative Research studies using Metamorph™

Metamorph™ is currently being used at Kent State University to analyze data on several qualitative research projects. Metamorph™ was first purchased by the Department of Special Education and used to assist in scanning the ERIC CD-ROM for articles in the area of deaf education.

More extensive exploration of Metamorph's™ possibilities included analyzing teacher journal transcriptions and researchers' observational notes for the Lighthouse Educational Enhancement Project. This IBM partnership grant involves Kent State University and three surrounding school districts working together to restructure math education, supported by the use of technology.

The success of Metamorph™ as a qualitative research tool has been shared with several research classes at Kent State University. As a result, one master degree student and three doctoral students have begun working with Metamorph™ to assist them with their research projects and/or dissertations.

The most significant breakthrough with Metamorph™ as a qualitative research tool has happened most recently. An ellaborate partnership grant currently in progress at Kent State University is entitled Cooperative Alliance for Gifted Education (CAGE). This project involves as many as fifteen different educational, community and business agencies committed to restructuring education. In order to determine the effectiveness of their project, they are accumulating vast quantities of unstructured, text-based data in the form of observations, interviews, journals, and video tape. A team of researchers has

begun to categorize this data with the help of Metamorph™.

As the CAGE team members work with Metamorph™ they have been identifying their research needs. Ways to adapt and strengthen Metamorph™ have been determined. The beta version of this new tool is currently being tested.

Metamorph™ is proving to be the type of computer tool that can benefit qualitative research. It is the researcher that drives Metamorph™ through every step in the data refinement process. The researcher decides what to keep and what to get rid of. The researcher determines the categories and domains. At all points in the process it is the researcher who must extract meaning from his/her data. Metamorph's™ greatest contribution to the qualitative research process is its ability to speed up the process of dealing with large amounts of unstructured information.

Computer technology has lifted some of the burden off the data intensive tasks involved in qualitative research. Having the researcher immersed in the software design process is critical to the evolution of this type of technology. In so doing the technology will be adapted to the research process and not vice versa.

References

Brent, E. (1989). Is there a role for artificial intelligence in sociological theorizing? In G. Blank, J. L. McCartney, & E. Brent (Eds.), New technology in sociology: Practical application in research and work (pp. 129-137). New Brunswick, NJ: Transaction Publishers.

Conrad, P. & Reinharz, S. (1984). Computers and qualitative data: Editor's introductory essay. Qualitative Sociology, 7(1 and 2), 3-15.

Danziger, J. N. (1989). Waiting for the revolution: The use of microcomputers by social scientists. In G. Blank, J. L. McCartney, & E. Brent (Eds.), New technology in sociology: Practical application in research and work (pp. 57-78). New Brunswick, NJ: Transaction Publishers.

Fielding, N. G., & Lee, R. M. (Eds.), Using computers in qualitative research. Newbury Park, CA: Sage Publications, Inc.

Freidheim, E. A. (1984). Field research and word processor files: A technical note. Qualitative Sociology, 7(1 and 2), 90-97.

Gluck, M. (September 27, 1991). Hypertext background. Discussion on Qualitative Research for the Human Sciences, QUALRS-L@UGA.BITNET.

Lyman, P. (1984). Reading, writing, and word processing: Toward a phenomenology of the computer age. Qualitative Sociology, 7(1 and 2), 75-89.

Metamorph™: Version 3.4 for DOS. (1991). Cleveland, OH: Thunderstone Software from Expansion Programs International, Inc.

Pfaffenberger, B. (1988). Microcomputer applications in qualitative research. Newbury Park, CA: Sage Publications, Inc.

Schrodt, P. A. (1989). Artificial intelligence and formal models of international behavior. In G. Blank, J. L. McCartney, & E. Brent (Eds.), New technology in sociology: Practical application in research and work (pp. 113-127). New Brunswick, NJ: Transaction Publishers.

Seidel, J. (1991). Method and madness in the application of computer technology to qualitative data analysis. In N. G. Fielding & R. M. Lee (Eds.), Using computers in qualitative research (pp. 107-116). Newbury Park, CA: Sage Publications, Inc.

Tesch, R. (1989). Computer software and qualitative analysis: A reassessment. In G. Blank, J. L. McCartney, & E. Brent (Eds.), New technology in sociology: Practical application in research and work (pp. 141 -154). New Brunswick, NJ: Transaction Publishers.

Tesch, R. (1991). Software for qualitative researchers: Analysis needs and program capabilities. In N. G. Fielding & R. M. Lee (Eds.), Using computers in qualitative research (pp. 16-37). Newbury Park, CA: Sage Publications, Inc.

Wilson, T. (September 25, 1991). Perspective. Discussion on Qualitative Research for the Human Sciences, QUALRS-L@UGA.BITNET.

* Qualrs-L, to join this discussion group via BITNET, issue the following command at the VM/CMS prompt: TELL LISTERV AT UGA SUB QUALRS-L (your full name).

** Kwalitan™ 3.0, Contact person: Vincent Peters, U211384@HNYKUN11.BITNET, Department of Research Methodology, Catholic University of Nijmegen, The Netherlands.

*** ATLAS/ti, Contact person - Thomas Muhr, MUHRTH@DB0TUI11.BITNET, Project ATLAS, Technical University of Berlin.

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